MD REMEMBERS: A Pioneer in DNA Research

In honor of the centennial of Oswald Theodore Avery, who led the Rockefeller Institute team that identified DNA as the transmitter of genetic information, his friend and colleague Dr. René Dubos recently published a biography* of the shy physician-bacteriologist known as "the Professor" or "Fess." According to his biographer, "Avery and the Institute had much in common. . . . They both emerged and developed in the atmosphere of expectancy generated by a few triumphs of scientific medicine at the end of the nineteenth century; both followed an intellectual course that led them from the study of specific diseases to large problems of theoretical biology; both became part of a culture in which laboratory scientists were regarded as members of a kind of priesthood, willing to accept social constraints for the sake of intellectual privileges."

When Dr. Avery joined the Institute hospital staff in 1913, he moved into a small laboratory where for 35 years most of his experiments were conducted on *Diplococcus pneumoniae*. Referring to his preoccupation with this species as "digging a deep hole in one place," he used simple equipment and kitchen chemistry to uncover a rich vein of information concerning immunological responses as well as pneumococcal biology.

Early in his career at the Institute, Avery, collaborating with Dr. Alphonse R. Dochez, discovered that pneumococci produced immunologically specific soluble substances that could be demonstrated in the body fluids of infected patients. In 1923 chemical studies by Drs. Michael Heidelberger and Avery revealed that these substances were polysaccharides in the cellular capsules. These findings and Avery's discovery that the virulence of pneumococci depends on their capsules and that minute chemical differences in the polysaccharides each elicits a specific immunological response contributed significantly to immunochemistry.

* *The Professor, The Institute, and DNA* (The Rockefeller University Press).

Tracking Down DNA. Avery's interest in a transforming substance was aroused by British pathologist Fred Griffith's report in 1928 that avirulent rough-surfaced pneumococci could be made to change to virulent smooth-surfaced cells.

Dr. Oswald Theodore Avery

When Avery encouraged two young physicians in his laboratory to investigate this surprising phenomenon, Dr. J. L. Alloway succeeded in preparing the transforming substance. He found that the active material could be precipitated with alcohol but the resulting thick, syrupy substance was readily inactivated by pneumococcal enzymes.

After Alloway left the laboratory in 1932, Avery continued the experiments. Frustrated by their irreproducibility, he often remarked: "Disappointment is my daily bread, but I thrive on it." Although he was determined to obtain the active principle in a pure form before attempting to establish its chemical identity, he suggested that it might be a nucleic acid.

Before this speculation could be proved, new methods of producing, purifying, and assaying the substance were developed with the help of the late Dr. Colin MacLeod, and Dr. Maclyn McCarty who identified the transforming substance as deoxyribonucleic acid (DNA). Avery, MacLeod, and McCarty reported their findings in 1944 but the genetic role of DNA was not universally accepted until 1952.

Background. Oswald Avery was born October 21, 1877, in Halifax, Nova Scotia, where his father was pastor of a Baptist church and an amateur pharmacist; he claimed that his preparation "Avery's Auraline," was useful for the "relief and cure of deafness, earaches and noises in the head." Answering a "divine call," Rev. Avery moved his family to New York's lower East Side in 1877 to preach at the Mariners' Temple. "Ossie" played his cornet before Sunday services.

After attending the New York Male Grammar School and Colgate Academy, he received his B.A. at Colgate University in 1900 and his M.D. at Columbia University's College of Physicians in 1904. He practiced for three years, then joined the Hoagland Laboratory, and six years later moved to the Rockefeller Institute.

A skilled debater at college, Avery seldom participated in general discussions at the Institute and avoided public appearances, but his assistants referred to his polished soliloquies on research as "the Professor's Red Seal Records." He never assigned his young associates to a problem but encouraged individual initiative and gently maneuvered them into a departmental project. Acknowledging his colleagues contributions when he received the Kober Medal, he modestly said: "All I had to do was pick their brains."

Avery, who shared a New York apartment with his fellow bachelor Dr. Dochez, rarely traveled except for his summer trips to Maine, where he sailed, collected ferns and wildflowers, and painted landscapes and seascapes. He retired in 1948 and moved to Nashville near his brother Roy, Vanderbilt University bacteriology professor.

In the 1930s Avery suffered from Graves' disease and underwent a thyroidectomy. During the summer of 1954 he was thought to have gallbladder disease but surgery revealed an extensive hepatoma. After a very painful illness, he died on February 20, 1955.